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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
LIEW, ALEX KOK SOON	
ART UNIT	**PAPER NUMBER**
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/688,326	WEISS ET AL.	
	Examiner	Art Unit	
	Alex Liew	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6,7 and 9-13* is/are rejected.

7)☒ Claim(s) *5,8 and 14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The examiner reconsidered the final rejection made on April 30, 2007 and concluded that the rejection was not proper. The examiner will reopen case for prosecution.

2. The applicant pointed it out in a telephone interview, on September 7, 2007, Takayama does not disclose 'reviewing, using imaging according to a relatively higher resolution imaging and positioning protocol, the first defects, wherein the reviewing of the first defect performed concurrently with detecting of the second defect.' The examiner agrees with applicant.

3. In the examiner's new search Ohara (US pat no 6,870,169) discloses a method for inspection of flat patterned media comprising:

detecting a first defect of the flat patterned media through an imaging means using a relatively lower resolution imaging and positioning protocol (see figure 8, element 103, for example figure 4 and 5, the inspection process is to obtain an entire image of the wafer is obtained at lower resolution);

detecting a second defect of the flat patterned media through an imaging means using a relatively lower resolution imaging and positioning protocol (see figure 8, element 303, if there is more than one defect, which is true in almost every case, than 'next defect' is read as the second defect); and

reviewing, using imaging according to a relatively higher resolution imaging and positioning protocol (see figure 5, the review / analysis section obtains a more detail image of the defect, shown at higher resolution).

Obara does not disclose reviewing of the first defect is performed concurrently with detecting of the second defect. Takeuchi (US pat no 6,519,357) discloses reviewing of the first defect is performed concurrently with detecting of the second defect (see column 9, lines 66 to 67 and column 10, lines 1 to 10). One skilled in the art would include step of performing detection and reviewing of defect at the same because the system does not have to process all the defects first order to initial analysis process, by performing detection and analysis at the same time, one will cut inspection processing time.

DETAILED ACTION

Claim Objections

Claims 5, 8 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

With regards to claim 5, the examiner cannot find any applicable prior and / or suggestion disclosing associating costs for each said arc signifying a module movement from the first defect to the second, according to a suitable cost function selected from functions representing the cost of missing other defects, distance or require motion and

review worthiness of a target defect candidate, and thereby obtaining a resulting graph and solving the resulting graph for finding a minimum cost path, represented by an ordered sequence of defect to defect transitions, from the current location of the defect review sub-system module to the end of a window considered along scanning direction in combination with the rest of the limitations of claims 3 to 5.

With regards to claim 8, the examiner cannot find any applicable prior art and / or suggestions disclosing compensating for spatial misalignment at sensor pixel level to result in either the validation of the existence of a legitimate defect at the candidate location or rejection of the defect as a false defect, including an artifact of known limitations of the low resolution in combination with the rest of the limitations of claims 3 and 8.

With regards to claim 14, see the rationale for claim 5.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3, 9, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Obara ('169) in view of Takeuchi ('357).

With regards to claim 1, Ohara discloses a method for inspection of flat patterned media comprising:

detecting a first defect of the flat patterned media through an imaging means using a relatively lower resolution imaging and positioning protocol (see figure 8, element 103, for example figure 4 and 5, the inspection process is to obtain an entire image of the wafer is obtained at lower resolution);

detecting a second defect of the flat patterned media through an imaging means using a relatively lower resolution imaging and positioning protocol (see figure 8, element 303, if there is more than one defect, which is true in almost every case, than 'next defect' is read as the second defect); and

reviewing, using imaging according to a relatively higher resolution imaging and positioning protocol (see figure 5, the review / analysis section obtains a more detail image of the defect, shown at higher resolution).

Obara does not disclose reviewing of the first defect is performed concurrently with detecting of the second defect. Takeuchi discloses reviewing of the first defect is performed concurrently with detecting of the second defect (see column 9, lines 66 to 67 and column 10, lines 1 to 10). One skilled in the art would include step of performing detection and reviewing of defect at the same because the system does not have to process all the defects first order to initial analysis process, by performing detection and analysis at the same time, one will cut inspection processing time.

With regards to claim 3, see the rationale and rejection for claim 1. In addition, the worthiness measure for each defect is shown in figure 5, where the energy and composition information of the defect is measured.

With regards to claims 9, 10 and 11, see the rationale and rejection for claims 1 and 3.

3. Claims 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Obara ('169) in view of Takeuchi ('357) as applied to claim 1 further in view of Yaroslavsky (US pub no 2003/0118245).

With regards to claim 2, Obara and Takeuchi disclose all the limitations of claim 1; Takeuchi discloses reviewing defects on the fly (see column 9, lines 66 to 67 and column 10, lines 1 to 10, the detection and reviewing are being performed concurrently), but do not disclose using automatic focus imaging. Yaroslavsky discloses using automatic focus imaging (see paragraph 5). One skill in the art would include automatic focusing because to relieve strait on the photographer, so the photographer can focus on taking a more precise image of the electronic part.

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Obara ('169) in view of Takeuchi ('357) as applied to claim 3 further in view of Bishop (US pat no 4,589,140) and Fukushima (US pat no 5,991,688).

With regards to claim 4, Obara and Takeuchi disclose all the limitations in claim 3, but do not maximizing a number of higher priority defect candidates captured by said defect review sub-system modules. Bishop discloses maximizing a number of higher priority defect candidates captured by said defect review sub-system modules (see figure 3, the defects are prioritized from image A to E), but fails to disclose minimizing distance travel by said defect review. However, Bishop discloses one would scan over the entire flat patterned media and then later come back to examine candidate defect area using higher resolution (see column 4 lines 24 to 33), which suggest it is best to find the shortest or minimum distance to the next candidate defect to save time. One skilled in art would include prioritizing defects because to allow the operator to correct the more sever defects and the lesser defects can be ignore to save time.

Bishop does not disclose constructing a forward flow graph with nodes. Fukushima discloses constructing a forward flow graph with nodes corresponding to current position of the vehicle and arcs corresponding to feasible motions from current position, for each arc signifying a module move from one node to another node (see figure 3, the nodes located at R0 to R7 and the move start from R0 moving from one node to another sequentially, see also column 10 lines 32 to 49 showing movements from R1 to R3, each node is read as a defect). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to include a minimum distance calculation because to save time and processing power from the system while moving from one defects to another, to improve system performance.

3. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Obara ('169) in view of Takeuchi ('357) as applied to claim 3 further in view of Yaroslavsky (US pub no 2003/0118245).

With regards to claim 6, Obara and Takeuchi disclose all the limitations of claim 3; Obara discloses starting at a pre-determined distance from a target candidate location and during the motion of the defect review sub-system module (see figure 6, elements 100, 101 and 102, once the position of the defect is acquire, the stage is move to the position of the defect), but fails to disclose automatically focusing the imaging element, focus quality measure means, interpolating sample means and z-axis maximum positioning means. Yaroslavsky discloses obtaining a focus quality measure computed over the images to sample a focus quality measure computed over the images to sample a focus quality measure computed over the images to sample a focus quality curve (see figure 1, a set of images are create then for each image the edge density is computed and plotted on a graph in figure 2), interpolating the samples of the focus quality curve with a smoothing function to determine a maximizing focus point for a z-stage moving the focusing optics (see figure 2, the sample are Fp1 and Fp2, and from those two or more samples the curve is created, indicating two maxima which have the highest edge density corresponding to their image in the set) and directing the z-stage to a the z-axis position which maximizes the said focus quality metric curve to achieve sharpest focus of the target candidate location (see figure 3, finds the optimum focus position of the imaging sensor, optimum position shown in fig 2 Fp1 and Fp2, the sensor

indicating the z-axis position, imager shown in fig 4 also see paragraph 4 middle of the paragraph and paragraph 5). The methods described in Yaroslavsky are to automatically find the best focus for each image by using focus level and edge density graph. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to include an auto-focusing system because to minimize the errors and variations during focusing on a image to produce the best images for inspection (see paragraph 4, last 7 lines).

With regards to claim 7, Obara and Takeuchi disclose all of the claim elements / features as discussed above in rejection for claim 3 and incorporated herein by reference; Obara capturing a sequence of image data from an imaging element of the defect review sub-system (see figure 6, element 113, when there are more than one defects in the wafer image, the stage will move to another defect area to acquire image of the defect), but fails to disclose using sequence of image data in combination with said focus quality measure computed over the images to sample the focus quality curve. Yaroslavsky discloses using sequence of image data in combination with said focus quality measure computed over the images to sample the focus quality curve (see figure 1, step 110 create a set of images of the object then from the images a plot of focus position versus edge density is created). See the motivation for claim 6.

4. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Obara ('169) in view of Takeuchi ('357) as applied to claim 11 further in view of Gilliland (US pat no 5,999,642).

With regards to claim 12, Obara and Takeuchi disclose all the limitations discussed in claim 11, but do not disclose defect detection system is mounted on a first moveable gantry. Gilliland discloses defect detection sub-system is mounted on a first moveable gantry and the defect review sub-system is mounted on a second movable gantry (see figure 1, element 12 first gantry moving along the A and A^{I} path and figure 1, element 12b second gantry moving along B and B^{I} path with a set of cameras, 16A and 16B), but does not the first and second does not move to together on the same axis.
Takayama suggests that the reviewing section (see figure 1, element 4) and detecting section (see figure 1, element 5) must move with each other (see column 6 lines 21 to 30) as the X-Y stage is move the optical devices 1–4 and 1–5 are always opposite position of each other. One skill in the art would want the reviewing and detecting section together because to use laser light to transmit light to the image pick sensor to produce a detail image for inspection.
It would have been obvious to one having ordinary skill in the art at the time of the invention was made to include a pair of gantry because to move along the horizontal and vertical to allow images of the object to be capture for inspection.

With regards to claim 13, see the rationale and rejection for claim 12.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alex Liew whose telephone number is (571)272-8623. The examiner can normally be reached on 9:30AM - 7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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9/20/07

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